

Stories from the Deep

Written and Illustrated by the
TWO-HUMPED ABALONE and OTHER MOLLUSKS
... with special assistance from PAMELA BROOKE *

Hi there! My name is Big Foot. I am a two-humped abalone. I look like I have two shells but I only have one. I live in the ocean. I have a very big shell. I like my shell because when I grow, my shell grows. You would like it in the ocean. Join me. —by Geoffrey Bertonneau, age 8

Blue mussel, quahog clam, periwinkle snail, and two-humped abalone! In the Smithsonian's National Museum of Natural History—where a wide variety of shells from around the globe are exhibited—young visitors apply their imaginations to a knowledge of the facts, so as to gain entry into the world of mollusks. The occasion is a four-session course entitled "Shells and the Animals Inside," sponsored by the Smithsonian Resident Young Associates.



In the National Museum of Natural History's Discovery Room with teacher, Pamela Brooke, students apply their imaginations to a knowledge of the facts, so as to gain entry to the world of mollusks.



The purpose of this course—according to the teacher, PAMELA BROOKE—is to gain a "greater awareness of one's own inner imaginative world, as well as a better understanding of the world of nature." Both writers and artists are distinguished by their ability to experience the world from an *unlikely perspective*, she explains; and the classes she teaches are intended to develop this ability. First her students learn the unique life history of mollusks. Then, when they have become familiar with the scientific information and have examined the mollusk from a human perspective, they begin creative writing assignments and art activities designed to shift that perspective: the students must now imagine *themselves* as mollusks.

You can use a similar approach in your school classroom, with easy-to-find shells like mussel, oyster, whelk, and snail. Suggestions on how to do so follow, but first—here are some important facts about mollusks.

Mollusk Facts

Mollusks have been on earth for more than 500 million years. There are more than 100,000 species of mollusks, plus another 55,000 extinct species that have left a fossil record of their existence.

Mollusks are invertebrates, which means that they are animals without backbones. Most mollusks have

[*Editor's note: Pamela Brooke, whose materials provide the basis of this article, is a writer and producer of children's media.]

either an outside or an inside shell to support their soft bodies. Mollusks can be found on land, in fresh water, and in the ocean.

Of the five major classes of mollusks, most are either gastropods (such as *snails*) or bivalves (such as *clams* and *oysters*). Most gastropods have a coiled single shell, while the shell of a bivalve consists of two valves joined by a hinge, a horny ligament, and one or two muscles. Gastropods close their shells with a trap door called an operculum. Bivalves close their shells with muscles inside their bodies. Gastropods have a tractor-tread-like tongue (called a *radula*), with teeth on it, for scraping food off objects. Bivalves do not have a radula but get their food from the water that passes through their gills. Tiny hairs (*cilia*) push plankton and other food particles toward the bivalve's internal mouth.

The other three major classes of mollusks, besides gastropods and bivalves, are as follows:

- **Chitons**—marine dwellers with eight overlapping shelly plates joined to each other by a leathery girdle.
- **Tusks**—marine dwellers with curved, tubular shells open at both ends.
- **Cephalopods**—marine squids, octopuses, and nautilus having a head region provided with tentacles, large eyes, powerful jaws. The shell is usually either internal or lacking.

Shells in a Box: Discovery!

After introducing your students to these facts about mollusks, divide the class into groups of no more than five students each. Give each group an egg carton or other compartmentalized box containing an assortment of seven or eight shells, plus an elementary field guide with the pages marked to indicate where the information can be found about the shells you have included in the box. (For suggested titles of elementary field guides, see the bibliography at the end of this article, page two.)

The contents of these "Discovery Boxes" may be selected and arranged according to any coherent scheme you wish. One box might contain a sampling of different kinds of mollusks; one might be devoted entirely to bivalves, another just to gastropods, another to shells that are brightly colored, and still another to shells having interesting patterns or shapes. For each box choose a name that will tell the children why these particular shells are grouped together, and write this name on the lid of the box. For example, in the National Museum of Natural History's Discovery Room, where the idea for Discovery Boxes originated, boxes devoted to shells are named "Mollusks," "Shells That Open," "Shells That Spiral," "Color in Shells," "Limpet Shells," "Bivalves," and "Look Inside a Shell" (which contains cross sections of shells; easy for you to do too if you have access to a diamond-bladed power saw). Whatever your combinations of shells, the idea is to enable the children to look at shells from a number of different angles and to see some of the many possible interrelations that a given set of objects from the world of natural history may have.

Let each group of children spend about ten minutes with each box, handling and examining the contents and looking at the field guide. From each box, have each child choose and sketch on a worksheet the one shell that he or she would most like to live in. Have him write down the following information about his favorite shells and the animals that live inside: name, where found, size, color, food, interesting facts about behavior. When every student has examined every box and recorded information about four or more shells, the time is right for Assignment #1, "What If You Lived in a Shell?"

What If You Lived in a Shell?

● *Can you imagine what it would be like to spend your life in a shell?* If you could pick a shell to live in, what would it look like? Would it be large or tiny? Would it be round and smooth or pointed and sharp? Would your shell be plain and simple or would it have bright colors and patterns?

● *Write a story or poem about your life in an imaginary shell.* Describe what your shell would look like and how you would fit inside it. Would you live on land, in a pond, or in the ocean? In a dark, hidden

crevice—or out in the open where everyone could see you? What would you do during the day and at night? What would you like about living in a shell? What would you *not* like about it? If you were outside your shell, what would make you suddenly clam up? What would you dream about if you lived in a shell? What would you wish for? What would make you happy or sad?

Since this is a story from your own imagination, ANYTHING can happen! Be sure to include a drawing of your imaginary shell.

The following day, after the children have shared their stories and drawings, you might discuss with them how animals make their shells and how mollusks reproduce; and read aloud Leo Lionni's story, *The Biggest House in the World*, about a little snail that wanted its shell to be huge and colorful. Some examples of fossil shells might also be shown and discussed now—in preparation for Assignment #2, "A Mollusk Folktale."

A Mollusk Folktale

Storytellers from many countries have had fun making up tales about how animals came to be the way they are. These imaginary stories are called folktales. There are stories about how the camel got its hump, how the rattlesnake got its rattles, how the leopard got its spots, how the butterfly got its name.

● *Can you make up a folktale about a mollusk?* You could write about how you think the snail got its operculum (the trap door it uses to close its shell). Think about what a snail's life would have been like before it had a way of closing its shell. What might have happened to the snail to convince it that it really needed a trap door? And then how did the snail actually get the door to its house? Use your imagination and see what kind of a story you can invent.

You can write about any mollusk you want to. For example, you might want to tell about how the clam lost its head or how the snail got teeth on its tongue. Another story you might choose is how the octopus lost its shell. Can you think of other ideas for mollusk folktales?

More Suggestions

In addition to writing folktales, other mollusk activities that students enjoy are: making collages to illustrate their imaginary lives as mollusks; observing live mollusks, such as slugs and aquarium snails; discussing the many ways that people use the shells of mollusks; making shell windchimes (see Carol Inouye's *Nature Craft*, listed in the bibliography, for directions); learning about the anatomies of univalves and bivalves through illustrated class discussion; and, as a final writing assignment, rising to the cry of "Attention Please . . . Calling All Mollusks!"

"Attention Please . . . Calling All Mollusks"

What if all the mollusks we've looked at in class got together and had a party?

● *Try writing a story about what happens at a mollusk party.* The mollusks in your story can be both real and imaginary. Tell us what their shells look like and how the animals are shaped. Why did they decide to have a party? How do they all get there? What do they do at the party? Are there any troublemakers? What happens when a cephalopod tries to dance with a bivalve? Without eyes and ears, how can the mollusks tell what's happening at their own party? What causes their party to end? Will there ever be another mollusk party?

Have fun . . .



And next time you see a shell, think about the animal inside.

Bibliography

- Abbot, R. Tucker. *Seashells of the World*. New York: Golden Press, 1962.
Abbot, R. Tucker. *Seashells of North America*. New York: Golden Press, 1969.

Continued on page two

Watch Out for Cemeteries!

Every town has one. Most towns have two or three. Close to where you're teaching now, quite possibly within walking distance of your school, watch out and you'll find a cemetery.

And in that cemetery large or small—on wooden or stone markers, elaborate or simple—your students may find clues to the people and events, the values and social patterns, of their community and the nation itself. This article suggests just a few of the many possible ways that you can draw on that wonderfully rich but often neglected curriculum resource—the cemetery near by.

Where to Look

Let your fingers do the walking first. The best place to begin looking for a cemetery to visit is under the heading, "Cemeteries and Memorial Parks," in the Yellow Pages of your telephone directory, where public cemeteries are listed as well as cemeteries for many different ethnic groups, religious denominations, and fraternal organizations.

The phone book by no means tells the whole story, however; for it is exceedingly common, in both rural and urban areas, for family plots and even entire graveyards to be hidden away in unexpected places. Possible locations for such "pocket cemeteries" include country hilltops; parks and grounds surrounding city, county, and state building; churchyards; and university campuses. Information about these and other cemetery locations may be gotten from such sources as old city maps (available from your city clerk, planning office, local historical society, or the local history section of your library) . . . U.S. Geological Survey topographic maps (often on file in libraries or available from surveyors and civil engineering firms) . . . morticians and funeral directors . . . oldtimers around town (who may know not only the locations of out-of-the-way plots but also who is buried in them) . . . stonemasons, foresters, surveyors, and county maintenance crews.

Once you have found a cemetery to visit—and permission for the outing has been obtained from the cemetery office and from your students' parents—you are ready to think carefully about the purpose of your visit and to develop a teaching approach in line with your curriculum objectives.

Developing an Approach

In the teaching approach that follows, the graveyard is seen as a *small universe of tangible evidence*, which can serve as a powerful stimulus to further inquiry when used to introduce a unit of study on "the community."

Essentially the plan is this: In the cemetery, students work in teams to gather information about their community. Then back in the classroom, they organize their data and, utilizing their cemetery evidence, draw tentative conclusions that subsequently are refuted or reinforced by additional evidence found in textbooks, census figures, old newspaper accounts, burial records, town histories, and other sources. Each team is assigned to one section of the cemetery (referred to in this article as a "survey plot"), containing between twenty and twenty-five tombstones apiece. One member of each team records his team's observations on a CEMETERY WORKSHEET. (see above.)

Back in the classroom, reading, writing, and math skills are brought into play as the information recorded on the worksheets sparks inquiry into the age of the community, the ethnic composition and origins and socioeconomic status of the people, changing life spans within the community, and community heroines and heroes.

● **Age of the Community.** After comparing notes to see which team has found the oldest tombstone in the cemetery, the children complete this statement on the chalkboard: "The oldest tombstone in this cemetery, dated _____" shows that this community is at least _____ years old. More information about the age of the community is then sought from town histories and other sources.

● **Ethnic Composition and Origins.** A composite list of the names and birthplaces recorded on the worksheets is drawn up. From this evidence, the children reach conclusions—which later may be corroborated by census reports—about the community's ethnic composition.

● **Socioeconomic Status.** After exhibiting their drawings of a "rich man's grave" and a "poor man's grave," the children discuss how a tombstone may reflect a person's social status and how a graveyard may be an indicator of a community's wealth.

● **Changing Life Spans.** The children subtract the birth date from the death date for every person in their sample to find each individual's life span. Then they figure average life spans from the 1870s and the

Cemetery Worksheet

- Find the oldest tombstone in your survey plot and enter the date right here:
- List all of the last names of the people buried in your survey plot. If any birthplaces are recorded on the tombstones, list those too.

Last Name	Birthplace	Last Name	Birthplace
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- Find a rich man's grave and a poor man's grave and make a sketch of each.
- Write down the birth and death dates of all the people you can find in your survey plot who died in the 1870s and all the people you can find who died in the 1970s.

1870s		1970s	
Birth date	Death date	Birth date	Death date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- Write down any information you can find about war veterans, political figures, or other important people buried in your survey plot.

1970s to determine whether people in their community today are longer or shorter lived than citizens of a hundred years ago.

● **Heroines and Heroes.** After evidence gathered in the cemetery about important town figures has been recorded on the chalkboard and discussed, each student draws on sources such as personal interviews and town histories to create a written or visual portrait of his favorite community heroine or hero.

By the end of their unit on "the community," the children will have learned a lot, not only about their own town or city but also about a means of familiarizing themselves with other communities as well, through that small universe of tangible evidence, the cemetery near by.

What Else Can You Learn?

And there are many more things to learn in a cemetery! In fact, virtually any subject in your curriculum, from geology to language arts, may be pursued to immense advantage there. What follows are just a few suggestions.

● **Geology.** Rock hounds of all ages will enjoy finding the answers to such "cemetery questions" as: From what kinds of rock are the markers made? What characteristics do these rock types have that make them good choices for tombstones? Are these rock types found locally, and if not, where do they come from? Are different rock types used in different time periods? Does the style of inscription seem to vary with the rock type used, and if so, what might be the reason for this variation?

● **History.** Launch a study of an era—say the nineteenth century. What first names did the people in your community have then? How long did they live? How old were they when they married and began having children? What do the stones' inscriptions reveal about people's beliefs and values? Students may also enjoy learning how to roughly date a tombstone from its shape and style of ornamentation and the kind of stone from which it was carved. *Underfoot* and *Early New England Gravestone Rubbings*, two books listed in the bibliography at the end of this article, contain guides to dating tombstones.

● **Social Science.** Conduct a full-scale study of man's population growth. Through the use of interment or burial records and visits to local cemeteries, older students can research the population makeup and growth of their community over a given time period—say the past 100 years, with highly instructive results. For details, see "A Grave Situation" by R. Lynn Bondurant, Jr., listed in the bibliography at the end of this article.



In a recent workshop sponsored by the Smithsonian's Office of Elementary and Secondary Education, teachers from the Washington, D.C., area discover that wonderfully rich but often neglected curriculum resource—a local cemetery.

● **Art.** Have the children make rubbings and photographs of gravestone designs and do research on graveyard symbolism. Then stage a school exhibition of these materials that will draw the attention of your community to this very important—and often overlooked—form of American folk art. *Early New England Gravestone Rubbings*, *Underfoot*, and *My Backyard History Book*, all listed in the bibliography, are sources that will help you here.

For a microcosmic view of man and the universe, there is no place like your nearest cemetery—where fascinating journeys begin.

Bibliography

- Bondurant, R. Lynn, Jr. "A Grave Situation." *Instructor* (April 1977): 110-14.
- Gillon, Edmund Vincent, Jr. *Early New England Gravestone Rubbings*. New York: Dover, 1966.
- O'Malley, Celia. *Look Out for Churches*. London: Victoria and Albert Museum, 1977.
- Weitzman, David. *My Backyard History Book*. Colvelo, Calif.: Yolla Bolly Press, 1975.
- _____. *Underfoot: An Everyday Guide to Exploring the American Past*. New York: Scribner's, 1976.

Stories from the Deep (Continued from page one)

- Conaway, Judith. *Animals With Shells*. London: Macdonald, 1977.
- Inouye, Carol. *Nature Craft*. New York: Doubleday, 1977.
- Jacobson, Morris K., and Emerson, William K. *Wonders of the World of Shells, Sea, Land, and Fresh Water*. New York: Dodd, Mead, 1977.
- Lionni, Leo. *The Biggest House in the World*. New York: Pantheon, 1968.
- Zim, Herbert S., and Ingle, Lester. *Seashores: A Guide to Animals and Plants Along the Beaches*. New York: Golden Press, 1955.

Attention Please: Calling All Teachers, Librarians, and Media Center Specialists!

A twenty-five-minute, 16 mm sound and color film of "Shells and the Animals Inside" will soon be available to *Art to Zoo* readers. Sponsored by the Smithsonian Resident Young Associates Program, and produced by the Institution's Emmy-award-winning Film Unit, the production features Pamela Brooke and her students in a variety of entertaining "mollusk activities," for you and your students to watch and then try yourselves in your school classroom. For information, write to Ann Bay, Office of Elementary and Secondary Education, A&I 1163, Smithsonian Institution, Washington, D.C., 20560. Rental Fee: \$10.00

Materials to Order

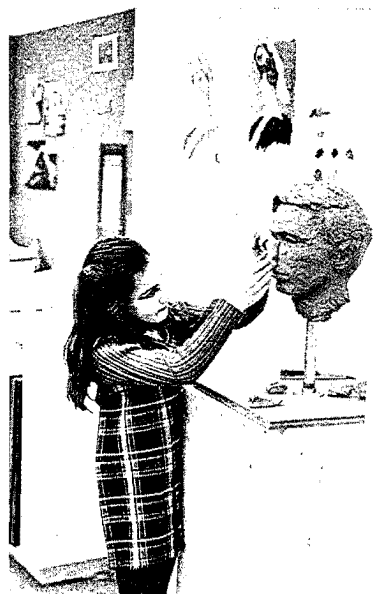
How to Build a Better Box: Illustrated instructions for making a Discovery Box will soon be available free of charge from the National Museum of Natural History. Write to the Discovery Room, National Museum of Natural History, Smithsonian Institution, Washington, D. C., 20560, for information.

Slides: A set of five color slides of beautiful and rare shells from the Smithsonian's collection may be purchased from Photographic Services, Room BC054, National Museum of History and Technology, Smithsonian Institution, Washington, D. C., 20560. PRICE: \$1.50.

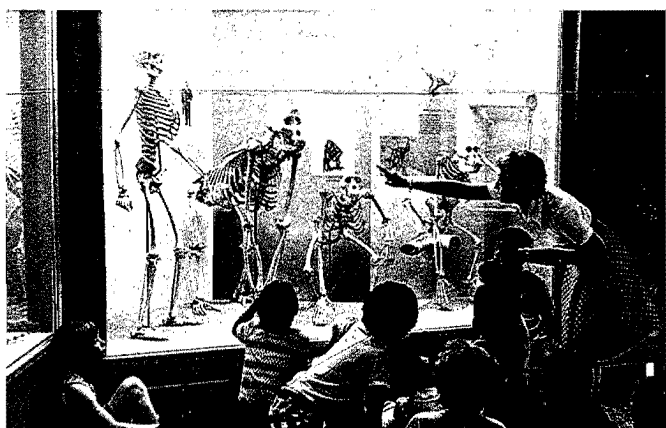
THE SMITHSONIAN INSTITUTION:



At the National Collection of Fine Arts: An improvisational tour.



At the National Portrait Gallery: A fifth-grader helps to complete a sculpture during a Discover Portraits tour.



At the National Museum of Natural History: An Early Man tour.



At the Chesapeake Bay Center for Environmental Studies: Fifth-graders investigate the physical and biological characteristics of an estuary.



At the Anacostia Neighborhood Museum: Young visitors take part in a singing game in conjunction with an exhibition of works by local artists.

WHO WE ARE

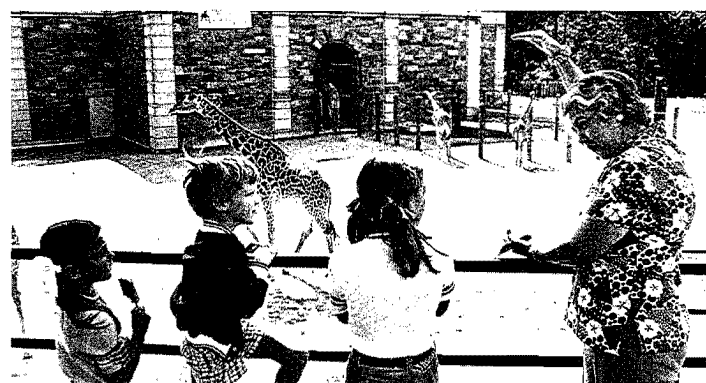
The Smithsonian Institution, founded in 1846, is a vast complex of museums and art galleries, scholars and experts, with facilities here in Washington, D.C., around the country, and overseas. It owes its beginning to James Smithson, a wealthy English scientist, who willed his fortune to the United States "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." Over succeeding generations, the Smithsonian Institution has carried out the terms of this bequest through scholarly activity in the fields of history, science, and art; through museum and library operation; and through the dissemination of information. In recent years, increasing emphasis has been placed on public education, with classes, films, lectures, musical events, guided tours, and other activities offered to growing numbers of children and adults. These photographs show schoolchildren from the Washington metropolitan area engaged in activities created especially for them by the various education departments of the Smithsonian. Look to future issues of ART TO ZOO for articles based on these activities.



At the Cooper-Hewitt Museum in New York City: Young visitors make friends with a spotted lamb during a recent sheep shearing and spinning and weaving demonstration designed to show city children the origins of wool.



At the Hirshhorn Museum and Sculpture Garden: The pleasures of a richly varied collection of nineteenth and twentieth century painting and sculpture are introduced.



At the National Zoological Park: Questions, Answers, and the Satisfactions of Wondering.



At the National Museum of History and Technology: Students examine revolutionary war artifacts.



At the National Air and Space Museum: Young visitors study the spacecraft exhibition featuring the Apollo command module, "Columbia."

ART^{TO}ZOO

ART^{TO}ZOO is a new publication, bringing news from the Smithsonian Institution to teachers of grades three through six. The purpose is to help you use museums, parks, libraries, zoos, and many other resources within your community to open up learning opportunities for your students.

Our reason for launching a publication dedicated to promoting the use of community resources among students and teachers nationally stems from a fundamental belief, shared by all of us here at the Smithsonian, in the power of objects. Working as we do with a vast collection of national treasures that literally contains the spectrum from "art" to "zoo," we believe that objects (be they works of art, natural history specimens, historical artifacts, or live animals) have a tremendous power to educate. We maintain that it is equally important for students to learn to use objects as research tools as it is for them to learn to use words and numbers—and you can find these objects close at hand, by drawing on the resources of your own community.

Our idea, then, in producing **ART^{TO}ZOO** is to share with you—and you with us—methods of working with students and objects that Smithsonian education staff members have found successful. This is the first of four pilot issues to be published in October, December, February, and April of this school year.

You are one of approximately 30,000 teachers across the United States chosen to receive and respond critically to these four issues. In April, an

evaluation form will be sent to you. To make it easier for you to know who we are, we have listed—here in the masthead—the Smithsonian museums and divisions whose education staff members will be contributing regularly. Please read the articles carefully and be absolutely frank in stating your opinion. We're counting on your help.

ART^{TO}ZOO

is a publication of the Office of Elementary and Secondary Education Smithsonian Institution Washington, D.C., 20560

Editor: Ann Bay (202) 381-5351

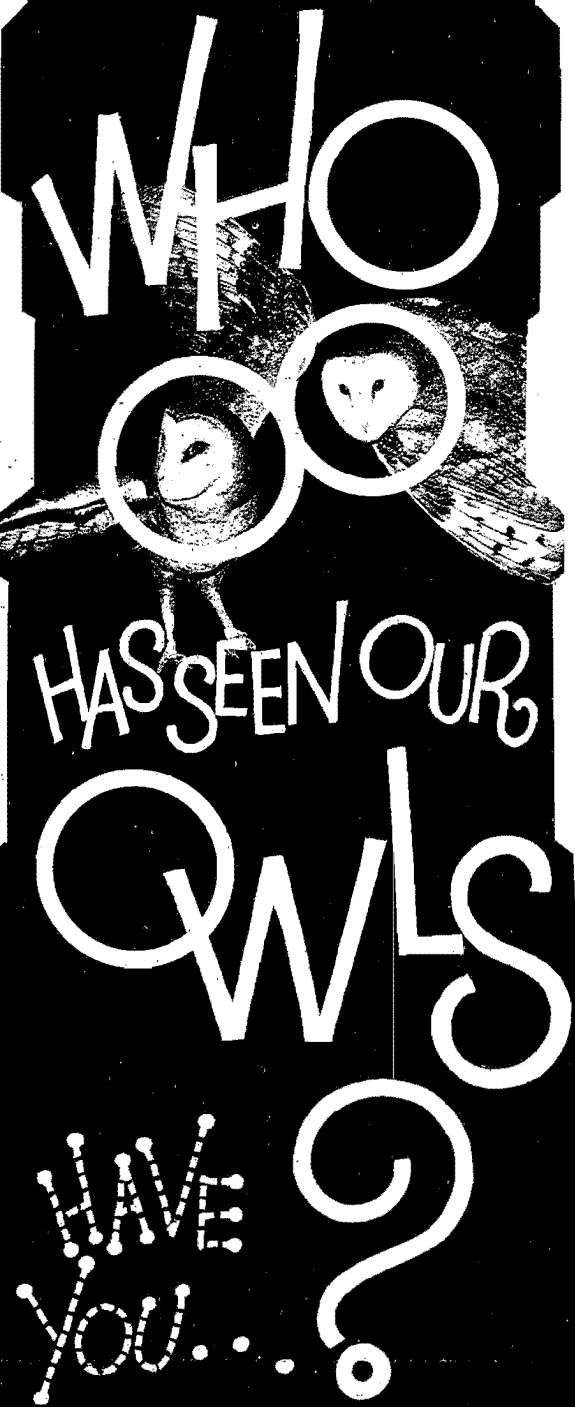
Regular contributors include:

THE ANACOSTIA NEIGHBORHOOD MUSEUM
THE CHESAPEAKE BAY CENTER FOR ENVIRONMENTAL STUDIES
THE COOPER-HEWITT MUSEUM OF DECORATIVE ARTS AND DESIGN
THE HIRSHHORN MUSEUM AND SCULPTURE GARDEN
THE NATIONAL AIR AND SPACE MUSEUM
THE NATIONAL COLLECTION OF FINE ARTS and the RENWICK GALLERY
THE NATIONAL MUSEUM OF HISTORY AND TECHNOLOGY
THE NATIONAL MUSEUM OF NATURAL HISTORY
THE NATIONAL PORTRAIT GALLERY
THE NATIONAL ZOOLOGICAL PARK

Smithsonian Institution Press

Designer: Stephen Kraft

Associate Editor: Ruth W. Spiegel



TEACHER'S NOTE: This article, which has been written to be read by your students, is the first in a series of pieces on Smithsonian events and people to be included in *Art to Zoo* this school year. Through these articles, which you may feel free to reproduce in any quantity needed, we hope to give students some insight into what we do here at the Smithsonian—and why—in a format that can be worked into your curriculum in a variety of ways.

There were five of them in all, living way up in the top of the shadowy tower of the old Smithsonian "Castle." There was Increase, the mother; Diffusion, the father,* and three downy chicks. But last week when we climbed up to feed them, we couldn't find them anywhere; and now we're sorry to report that although we've searched high and low we haven't heard a hoot from them since.

For nearly a hundred years the Smithsonian tower was inhabited by owls, as all self-respecting castle towers should be. The birds freely came and went and found plenty of rats and mice to eat on the grassy Mall beneath the tower. Because owls sleep by day and hunt by night, few people even realized the birds were there.

But then in the 1950s, the owls were evicted from the castle without notice. Owls drop castings or pellets, which are the undigested remains (such as bones and hair) of the animals they eat. The people who took care of the castle grew tired of cleaning up the pellets and decided the owls had to go. One morning the owls flew home to find that the windows to their tower had been locked against them.

And that was the end of owls at the Smithsonian for nearly twenty years—until the 1970s, when an active campaign was begun to bring these interesting and handsome animals (known since ancient times as "birds of wisdom") back to the castle.

Increase and Diffusion were installed in the tower last January with the help of bird expert John Mallen from the National Zoo. Early in May three chicks were hatched. While confined to the tower for several

* The names "Increase" and "Diffusion" are taken from the actual wording of the will of James Smithson, the Smithsonian's founder, who died in 1829, leaving his entire fortune to the United States to "found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."

months, our family of five was fed a "gourmet dinner" of four to six rats—or six to ten mice—every Tuesday and Thursday, plus more on Saturday. The feeding was done by a team of volunteers, who would climb up a series of steep ladders and through a trap door to where the birds were nesting.

Besides feeding the owls, the volunteers—who were protected by helmets and face masks—kept a written record of the amount of food eaten and how the birds looked during feedings. From the owls' pellets, they were able to trace favorite nesting places as well as other habits and movements within the tower. Sometimes the owls would become angry, as when a volunteer might get too close to the nest. Then the birds would hiss or roll their wings forward in an awesome threat display until the "intruder" backed off. Thus more than one volunteer received a sound pecking on the helmet from the strong, curved beak of the protective father owl!

Late last June, when it seemed the owls were firmly established in their new home, the tower windows were left open so that the animals could be free to glide around the Mall and hunt for their own food. The plan was that someone would still visit the tower several times a week to check on the owls and leave food and water in case it were needed. It was on such a visit recently that we discovered the owls had gone from the tower.



Here at the Smithsonian, though, we've not given up on that old to-whit-to-who. *Whooo* has seen our owls? Have you?